

## DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

Interim Final 2/5/99

### RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA725)

#### Current Human Exposures Under Control

Facility Name: BP Amoco Petroleum Products, Salt Lake City Refinery  
Facility Address: 474 West 900 North, Salt Lake City, Utah 84103-1494  
Facility EPA ID #: UTD 000826362

1. Has **all** available relevant/significant information on known and reasonably suspected releases to soil, groundwater, surface water/sediments, and air, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been **considered** in this EI determination?

  X   If yes - check here and continue with #2 below.

       If no - re-evaluate existing data, or

       if data are not available skip to #6 and enter "IN" (more information needed) status code.

#### **BACKGROUND**

##### **Definition of Environmental Indicators (for the RCRA Corrective Action)**

Environmental Indicators (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.   

##### **Definition of "Current Human Exposures Under Control" EI**

A positive "Current Human Exposures Under Control" EI determination ("YE" status code) indicates that there are no "unacceptable" human exposures to "contamination" (i.e., contaminants in concentrations in excess of appropriate risk-based levels) that can be reasonably expected under current land- and groundwater-use conditions (for all "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

##### **Relationship of EI to Final Remedies**

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near-term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Current Human Exposures Under Control" EI are for reasonably expected human exposures under current land- and groundwater-use conditions ONLY, and do not consider potential future land- or groundwater-use conditions or ecological receptors. The RCRA Corrective Action program's overall mission to protect human health and the environment requires that Final remedies address these issues (i.e., potential future human exposure scenarios, future land and groundwater uses, and ecological receptors).

##### **Duration / Applicability of EI Determinations**

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

**Current Human Exposures Under Control**  
**Environmental Indicator (EI) RCRIS code (CA725)**

Page 2

2. Are groundwater, soil, surface water, sediments, or air **media** known or reasonably suspected to be **“contaminated”**<sup>1</sup> above appropriately protective risk-based “levels” (applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action (from SWMUs, RUs or AOCs)?

|                               | <u>Yes</u> | <u>No</u> | <u>?</u> | <u>Rationale / Key Contaminants</u>   |
|-------------------------------|------------|-----------|----------|---|
| Groundwater                   | <u>X</u>   | ___       | ___      | Groundwater contaminated with up to 2.5 ft. of free product. BE TX constituents.          |
| Air (indoors) <sup>2</sup>    | ___        | <u>X</u>  | ___      | Occupied buildings have positive air pressure to eliminate potential indoor air pathway.  |
| Surface Soil (e.g., <2 ft)    | <u>X</u>   | ___       | ___      | Benzene, arsenic, lead, and chromium contamination in soil samples.                       |
| Surface Water                 | ___        | <u>X</u>  | ___      | Contamination does not contact surface water.   |
| Sediment                      | ___        | <u>X</u>  | ___      | No evidence of surface runoff.  |
| Subsurface Soil (e.g., >2 ft) | <u>X</u>   | ___       | ___      | Benzene, arsenic, and lead contamination in soil samples.                                 |
| Air (outdoors)                | ___        | <u>X</u>  | ___      | Contaminant concentrations for lead and benzene were below permitted operating emissions. |

\_\_\_\_\_ If no (for all media) - skip to #6, and enter “YE,” status code after providing or citing appropriate “levels,” and referencing sufficient supporting documentation demonstrating that these “levels” are not exceeded.

\_\_X\_\_ If yes (for any media) - continue after identifying key contaminants in each “contaminated” medium, citing appropriate “levels” (or provide an explanation for the determination that the medium could pose an unacceptable risk), and referencing supporting documentation.

\_\_\_\_\_ If unknown (for any media) - skip to #6 and enter “IN” status code.

**Rationale and Reference(s):**

| <u>Media</u> | <u>Contaminant</u> | <u>Levels of Concern</u> <sup>3</sup> | <u>Max. Detected</u> | <u>Location</u>   |
|--------------|--------------------|---------------------------------------|----------------------|-------------------|
| Groundwater  | Benzene            | 5 ug/l                                | Free-product         | Tank Storage Area |
| Groundwater  | Ethylbenzene       | 700 ug/l                              | Free-product         | Tank Storage Area |
| Groundwater  | Toluene            | 1,000 ug/l                            | Free-product         | Tank Storage Area |
| Groundwater  | Xylenes (total)    | 10,000 ug/l                           | Free-product         | Tank Storage Area |
| Groundwater  | Arsenic            | 50 ug/l                               | 340 ug/l             | MW-92-33          |
| Groundwater  | Lead               | 15 ug/l                               | 34.3 ug/l            | MW-61             |

Page 3

<sup>1</sup>“Contamination” and “contaminated” describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriately protective risk-based “levels” (for the media, that identify risks within the acceptable risk range).

<sup>2</sup>Recent evidence (from the Colorado Dept. of Public Health and Environment, and others) suggest that unacceptable indoor air concentrations are more common in structures above groundwater with volatile contaminants than previously believed. This is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration necessary to be reasonably certain that indoor air (in structures located above (and adjacent to) groundwater with volatile contaminants) does not present unacceptable risks.

<sup>3</sup>Levels of Concern for Groundwater Contaminant come from the Water Quality Maximum Contaminant Levels (MCL’s) Rule R309-103, Utah Division of Drinking Water.

**Rationale and Reference(s):**

| Media           | Contaminant | Levels of Concern <sup>4</sup> | Max. Detected | Location |
|-----------------|-------------|--------------------------------|---------------|----------|
| Surface Soil    | Benzene     | 1.4 mg/kg                      | 28.9 mg/kg    | SB-E1    |
| Surface Soil    | Arsenic     | 2.4 mg/kg                      | 10.3 mg/kg    | MW-92-33 |
| Surface Soil    | Chromium    | 64 mg/kg                       | 2,280 mg/kg   | SB-C3    |
| Surface Soil    | Lead        | 1,000 mg/kg                    | 3,310 mg/kg   | MW-92-31 |
| Subsurface Soil | Benzene     | 1.4 mg/kg                      | 83 mg/kg      | SB-F1    |
| Subsurface Soil | Arsenic     | 2.4 mg/kg                      | 9.8 mg/kg     | MW-92-31 |
| Subsurface Soil | Lead        | 1,000 mg/kg                    | 4,160 mg/kg   | MW-92-31 |

**Environmental Indicator (EI) RCRIS code (CA725)**

Page 3

3. Are there **complete pathways** between “contamination” and human receptors such that exposures can be reasonably expected under the current (land- and groundwater-use) conditions?

**Summary Exposure Pathway Evaluation Table**

Potential **Human Receptors** (Under Current Conditions)

| <b><u>“Contaminated” Media</u></b> | Residents | Workers | Day-Care | Construction | Trespassers | Recreation | Food <sup>5</sup> |
|------------------------------------|-----------|---------|----------|--------------|-------------|------------|-------------------|
| Groundwater                        | no        | no      | no       | no           | no          | no         | no                |
| <del>Air (indoors)</del>           | ---       | ---     | ---      | ---          | ---         | ---        | ---               |
| Soil (surface, e.g., <2 ft)        | no        | yes     | no       | no           | no          | no         | no                |
| <del>Surface Water</del>           | ---       | ---     | ---      | ---          | ---         | ---        | ---               |
| <del>Sediment</del>                | ---       | ---     | ---      | ---          | ---         | ---        | ---               |
| Soil (subsurface e.g., >2 ft)      | no        | no      | no       | no           | no          | no         | no                |
| <del>Air (outdoors)</del>          | ---       | ---     | ---      | ---          | ---         | ---        | ---               |

Instructions for **Summary Exposure Pathway Evaluation Table**:

1. Strike-out specific Media including Human Receptors’ spaces for Media which are not “contaminated”) as identified in #2 above.
2. enter “yes” or “no” for potential “completeness” under each “Contaminated” Media – Human Receptor combination (Pathway).

Note: In order to focus the evaluation to the most probable combinations some potential “Contaminated” Media - Human Receptor combinations (Pathways) do not have check spaces (“\_\_\_”). While these

Page 4

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<sup>4</sup>Levels of Concern for Surface and Subsurface Soils Contamination come from US EPA Region 9, Preliminary Remediation Goals, Industrial Soil concentrations.

<sup>5</sup> Indirect Pathway/Receptor (e.g., vegetables, fruits, crops, meat and dairy products, fish, shellfish, etc.)

combinations may not be probable in most situations they may be possible in some settings and should be added as necessary.

- ☒ **X** If no (pathways are not complete for any contaminated media-receptor combination) - skip to #6, and enter "YE" status code, after explaining and/or referencing condition(s) in-place, whether natural or man-made, preventing a complete exposure pathway from each contaminated medium (e.g., use optional Pathway Evaluation Work Sheet to analyze major pathways).
- ☐ **X** If yes (pathways are complete for any "Contaminated" Media - Human Receptor combination) - continue after providing supporting explanation.
- ☐ If unknown (for any "Contaminated" Media - Human Receptor combination) - skip to #6 and enter "IN" status code

**Rationale and Reference(s):**

**Residents** via contaminated:

**Groundwater:** No complete pathway. Interceptor trench and extraction well system in place and operating. Monitoring in downgradient wells show not detection of contamination.

**Soil (surface):** No complete pathway. All contaminated surface soil is within the refinery property boundary. No residents live on the refinery property.

**Soil (subsurface):** No complete pathway. All contaminated surface soil is within the refinery property boundary. No residents live on the refinery property.

**Workers** via contaminated:

**Groundwater:** No complete pathway. There are no on-site wells used for production, water supply, or other activities that would place workers in contact with contaminated groundwater.

**Soil (surface): Yes, a complete pathway may be expected.** Site workers wear protective clothing to limit the amount of dermal contact. However, dermal contact could occur to the hands and face.

**Soil (subsurface):** No complete pathway. Workers are not in contact with contaminated subsurface soils.

**Day-Care (or other non-productive and possibly sensitive receptor uses (e.g. schools, hospitals, etc.))** via contaminated:

**Groundwater:** No complete pathway. There are no day-care or other non-productive facilities at the refinery.

**Soil (surface):** No complete pathway. There are no day-care or other non-productive facilities at the refinery.

**Soil (subsurface):** No complete pathway. There are no day-care or other non-productive facilities at the refinery.

**Construction (workers )** via contaminated:

**Groundwater:** No complete pathway. There are no current activities on-site that would expose construction workers to contaminated groundwater.

**Soil (surface):** No complete pathway. There are no current activities on-site that would expose construction workers to contaminated soils.

**Soil (subsurface):** No complete pathway. There are no current activities on-site that would expose construction workers to contaminated subsurface soils.

**Trespassers** via contaminated:

**Soil (surface):** No complete pathway. There is no expectation of trespassers at the refinery as the facility is surrounded by a well maintained fence and 24-hour operations provides ample security measures.

**Recreation** via contaminated:

**Soil (surface):** No complete pathway. Recreational users are not expected at the refinery since the facility is surrounded by a well maintained fence and 24-hour operations provides ample security measures.

**Food** via contaminated:

**Groundwater:** No complete pathway. No food items are produced or grown at the refinery.

**Soil (surface):** No complete pathway. No food items are produced or grown at the refinery.

**Soil (subsurface):** No complete pathway. No food items are produced or grown at the refinery.

**History of Groundwater Corrective Action at the Amoco Refinery:**

Commencing in 1984 Amoco installed a groundwater recovery system consisting of three interceptor trenches. The three recovery trenches began pumping contaminated groundwater in December, 1984. Petroleum products were recovered from the trenches and groundwater was processed by Amoco's Waste Water Treatment System prior to discharge to the Salt Lake City POTW.

A review of the recovery trench system recommended installation of a fourth trench. In October, 1990 a fourth trench was installed and pumping commenced the first week of December, 1990.

Hydraulic control of contaminated groundwater was lacking in the southwest area near the Marketing Terminal. Amoco installed recovery well RS-W1 in the southwest corner of the Amoco property in late December, 1991. The well was pumped continuously from February 10 to April 13, 1992 as part of a pump test and has been pumping since then at about 15 gpm.

As a result of contaminated groundwater and free-phase hydrocarbon seepage into the Salt Lake City stormwater sewer located on the Union Pacific Railroad, Amoco installed three additional trenches along the west perimeter fence line adjacent to the Union Pacific property. Construction on the trenches was from May 13, to May 31, 1996. The recovery trenches began operations on June 3, 1996.

Currently, all groundwater flow paths that cross the refinery are captured by BP Amoco's recovery system, with the exception of an area where no recovery systems have been installed located north of the recovery system RS-W1 near the south end of the refinery. This area of no hydraulic control is also evident from the quarterly monitoring of groundwater levels in the area. Groundwater analysis data indicate that no groundwater contaminants have been detected either at the refinery or at the downgradient Union Pacific Railroad yard in this area of no hydraulic control. Furthermore, groundwater analysis data from monitoring wells along Warm Springs Road, located downgradient of the Union Pacific Railroad yard also show no indication of groundwater contamination by petroleum hydrocarbons. Data collected from 1996 to 1998 indicate that the zone of hydraulic control extends about 350 feet west from the refinery perimeter into the Union Pacific Railroad yard.

**BP Amoco Safety and Health program to reduce worker exposures to contaminants.**

To meet or exceed the Occupational Safety and Health Act of 1970, BP Amoco has developed a comprehensive Safety and Health program. Amoco developed the program following OSHA guidelines, standard refinery industry practices and American Petroleum Institute recommended practices. Amoco has provided guidance with written Safety and Health policies that govern the program and which are applicable to environmental risk management as follows:

- General Safety and Health Rules
- Employee Emergency Plans and Fire Prevention Plans
- Process Safety Management Policy
- Personal Protective Equipment (PPE) Policy
- Respiratory Protection Program
- Permit Program
- Control of Hazardous Energy
- Benzene Program
- Hazard Communication Program

- **Asbestos Program**

**The primary control programs used to manage worker exposure are (1) Hazard Communication Program, (2) Permit Program, (3) Personal Protective Equipment (PPE) Program, and (4) Process Safety Management.**

**Current Human Exposures Under Control  
Environmental Indicator (EI) RCRIS code (CA725)**

Page 6

- 4 Can the **exposures** from any of the complete pathways identified in #3 be reasonably expected to be **“significant”**<sup>6</sup> (i.e., potentially “unacceptable” because exposures can be reasonably expected to be: 1) greater in magnitude (intensity, frequency and/or duration) than assumed in the derivation of the acceptable “levels” (used to identify the “contamination”); or 2) the combination of exposure magnitude (perhaps even though low) and contaminant concentrations (which may be substantially above the acceptable “levels”) could result in greater than acceptable risks)?

No If no (exposures can not be reasonably expected to be significant (i.e., potentially “unacceptable”) for any complete exposure pathway) - skip to #6 and enter “YE” status code after explaining and/or referencing documentation justifying why the exposures (from each of the complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

\_\_\_\_\_ If yes (exposures could be reasonably expected to be “significant” (i.e., potentially “unacceptable”) for any complete exposure pathway) - continue after providing a description (of each potentially “unacceptable” exposure pathway) and explaining and/or referencing documentation justifying why the exposures (from each of the remaining complete pathways) to “contamination” (identified in #3) are not expected to be “significant.”

\_\_\_\_\_ If unknown (for any complete pathway) - skip to #6 and enter “IN” status code

**Rationale and Reference(s):**

**As outlined in the previous section, Workers and Construction workers may be infrequently exposed to contaminants in soil and possibly subsurface soils. Exposures are reduced or eliminated due to Amoco’s heightened protection requirements for excavations and excavation workers through proper use of Personal Protective Equipment and Health and Safety Monitoring. On-site construction workers are trained to identify potential risks and hazards associated with a Refinery and are required to adhere to on-site Health and Safety protocols including donning personal protective equipment when conditions warrant. These precautions reduce possible exposures by refinery or construction workers during excavations in areas of contamination.**

**Current Human Exposures Under Control  
Environmental Indicator (EI) RCRIS code (CA725)**

Page 7

- 5 Can the “significant” **exposures** (identified in #4) be shown to be within **acceptable** limits?

\_\_\_\_\_ If yes (all “significant” exposures have been shown to be within acceptable limits) - continue and enter “YE” after summarizing and referencing documentation justifying why

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<sup>6</sup> If there is any question on whether the identified exposures are “significant” (i.e., potentially “unacceptable”) consult a human health Risk Assessment specialist with appropriate education, training and experience.

all “significant” exposures to “contamination” are within acceptable limits (e.g., a site-specific Human Health Risk Assessment).

\_\_\_\_\_ If no (there are current exposures that can be reasonably expected to be “unacceptable”)-  
continue and enter “NO” status code after providing a description of each potentially  
“unacceptable” exposure.

\_\_\_\_\_ If unknown (for any potentially “unacceptable” exposure) - continue and enter “IN” status  
code

**Rationale and Reference(s):**

## Page 8

\_YE\_ YE - Yes, “Current Human Exposures Under Control” has been verified. Based on a review of the information contained in this EI Determination, “Current Human Exposures” are expected to be “Under Control” at the BP Amoco Salt Lake City Refinery facility, EPA ID #UTD000826362, located at Salt Lake City, Utah, under current and reasonably expected conditions. This determination will be re-evaluated when the Agency/State becomes aware of significant changes at the facility.

\_\_\_\_\_ NO - “Current Human Exposures” are NOT “Under Control.”

IN - More information is needed to make a determination.

Supervisor (signature) Date \_\_\_\_\_  
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(title) Hazardous Waste Section Manager  
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**FINAL NOTE: THE HUMAN EXPOSURES EI IS A QUALITATIVE SCREENING OF EXPOSURES AND THE DETERMINATIONS WITHIN THIS DOCUMENT SHOULD NOT BE USED AS THE SOLE BASIS FOR RESTRICTING THE SCOPE OF MORE DETAILED (E.G., SITE-SPECIFIC) ASSESSMENTS OF RISK.**